

## Section 6-5: Linear and Nonlinear Functions

**By the end of this lesson, you should be able to answer:**

- How do you graph linear and nonlinear functions?
- How do you identify the domain and range of a function?

**Where you might see this in the real world:**

- Machinery, travel, temperature

Define the following terms:

1. Function
2. Function notation
3. Domain
4. Range
5. Continuous
6. Linear function
7. Vertical-line test

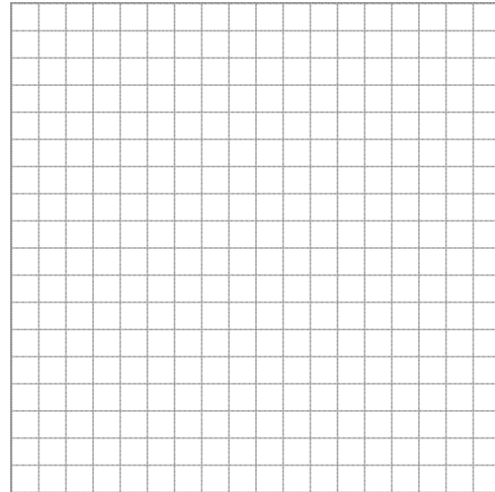
Up to this point, we have been looking at linear equations and inequalities. Each of these equations have given us a line to work with, thus the word "linear." But not all equations will give us a line. Sometimes we will look at equations and graphs that are made up of just points. These will often give us functions to work with.

To see whether we have a function or not, we need to look at the domain of each set. If there is a number that shows up more than once, check to see if they match up with the same number. If they do, then it is a function. If they do not, then it is not a function. If each value only shows up once, it is a function.

Example 1: To make coffee in a large coffee urn, one recipe calls for two spoonfuls for each cup plus 5 spoonfuls for the pot.

- a. Write a function where  $c$  is the number of cups of coffee being made and  $s$  is the total number of spoonfuls of coffee used.

b. Make a table and graph the data.

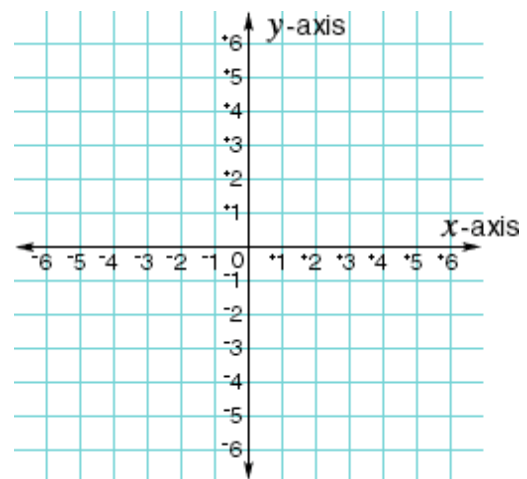


c. An office cafeteria has a coffee urn with the ability to make 16 to 35 cups. Determine the domain and range of the function as applied to this urn.

To test if we have a function, there are numerous ways to do this. First, we could just examine each value in the domain and see if it matches with just one value in the range. Second, we could look at the graph of it. This is where we would use the vertical line test. If we can draw a vertical line at any place on a graph and it touches more than once, then it is not a function. If the vertical line touches the graph only once, no matter where you put it, then it is a function.

Example 2: Graph the following relation, stating whether it is a function and listing the domain and range.

$$y = |x + 1|$$



Homework:

"That is what learning is. You suddenly understand something you've understood all your life, but in a new way." - Doris Lessing